



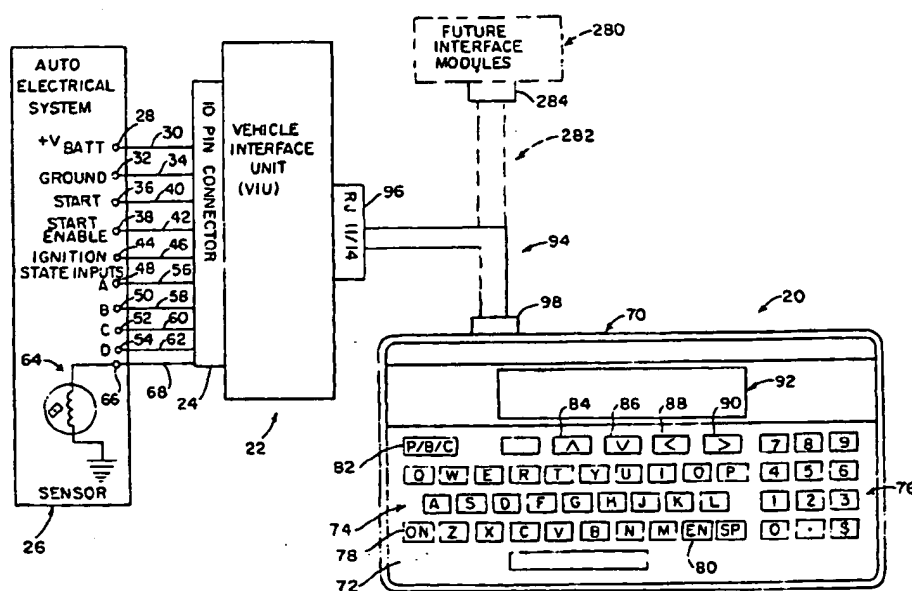
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : G07C 5/08		A1	(11) International Publication Number: WO 94/28518
			(43) International Publication Date: 8 December 1994 (08.12.94)
(21) International Application Number: PCT/US94/06122 (22) International Filing Date: 1 June 1994 (01.06.94) (30) Priority Data: 071,077 2 June 1993 (02.06.93) US (71) Applicant: TRANSPORTATION RECORDING SYSTEMS, INC. [US/US]; 302 South Jones Street, Barneveld, WI 53507 (US). (72) Inventors: CARMODY, C., Scott; 302 South Jones Street, Barneveld, WI 53507 (US). KRON, Gregory, M.; 14625 West Park Avenue, New Berlin, WI 53151 (US). (74) Agent: McCONNELL, Andrew, S.; Andrus, Scales, Starke & Sawall, Suite 1100, 100 East Wisconsin Avenue, Milwaukee, WI 53202 (US).		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CN, CZ, DK, FI, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: **SYSTEM FOR RECORDING EXPENSE-TYPE INFORMATION IN COMBINATION WITH INFORMATION PERTAINING TO ONE OR MORE OPERATING CHARACTERISTICS OF A VEHICLE**

(57) Abstract

A system for monitoring certain vehicle operating information and recording other data includes a vehicle interface unit (22) permanently mounted to a vehicle, and a data recorder unit (20) removably interconnectable with the vehicle interface unit (22). The vehicle interface unit (22) receives signals from the vehicle through the vehicle's interface connector (24), such as signals pertaining to distance traveled and other operating characteristics, e.g. operation of headlights, directional signals, brakes, or seat belts, and such signals are communicated through a communications link to the data recorder unit (20). The data recorder unit (20) includes a memory (250) in which such information is stored, and the data recorder unit (20) can be disconnected from the vehicle interface unit (22) and interconnected with an external device such as a computer (100) or printer (102) for outputting information stored in the memory (250). The data recorder unit (20) can also be used to store other information, such as pertaining to business expenses or the like. The data recorder unit (20) allows an operator to designate whether the miles traveled by the vehicle are for business or personal use, thus enabling the operator to keep close track of business or personal use of the vehicle and other expenses incurred by the operator. Information stored in the data recorder unit (20) can either be printed out on a printer (102) or download into a computer (100) for generating a subsequent printed report.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LU	Luxembourg	SN	Senegal
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

- 1 -

SYSTEM FOR RECORDING EXPENSE-TYPE INFORMATION
IN COMBINATION WITH INFORMATION PERTAINING TO
ONE OR MORE OPERATING CHARACTERISTICS OF A VEHICLE

BACKGROUND AND SUMMARY

5 This invention relates to a system for use in combination with a vehicle to monitor and record certain information pertaining to operation of the vehicle along with other information manually input by the operator, such as for use in tracking expenses.

10 Generally, it is beneficial for persons who use a vehicle in connection with a business to keep track of the number of miles traveled by the vehicle for business purposes. When the vehicle owner is an individual using his or her personal vehicle for business purposes, this
15 information can typically be used to generate a deduction on the person's income tax returns. When the owner of the vehicle is an employer, it is important to keep track of the amount of miles logged by the employee both for business and personal purposes.

20 In the past, a typical method of keeping track of business and personal use of a vehicle has been to maintain a written log in which the operator enters by hand the date of operation and information allowing the operator to calculate the number of business miles traveled, typically start and stop readings taken from the
25 vehicle's odometer. One drawback to this type of system is that it relies on the operator to accurately record the necessary information. Another drawback is that, if the operator wishes to keep track of other expenses, such
30 as meals, lodging, entertainment or the like, the operator must keep a separate log of such information, thus generating separate sets of records for related expense information. Another drawback is that the operator must diligently record expense information including vehicle
35 mileage in order to keep an accurate record, which is often easily overlooked.

- 2 -

It is an object of the present invention to provide a system for monitoring and recording information pertaining to vehicle operation for assisting an operator to accurately track and record business or personal use of the vehicle. It is a further object of the invention to provide a system enabling the operator to input and record other information, such as expenses pertaining to meals, lodging and entertainment. It is a further object of the invention to provide such a system which is user-friendly, making it as easy as possible for an operator to provide an accurate and reliable record of information pertaining to expenses and vehicle operation. A further object of the invention is to provide such a system which is relatively simple in its components and operation, yet which provides highly satisfactory performance.

In accordance with one aspect of the invention, a vehicle monitoring and data recording system includes a vehicle interface unit adapted for interconnection with the electrical system of the vehicle for sensing one or more operating characteristics of the vehicle, and for outputting a first set of data signals indicative of the sensed vehicle operating characteristic. The system further includes a portable recorder unit adapted for removable interconnection with the vehicle interface unit. The portable recorder unit includes a memory, an input for receiving the first set of data signals from the vehicle interface unit, and a manually operable data entry device. The input provides the first set of data signals to the memory, and the manually operable data entry device allows an operator to input data, to thereby output a second set of data signals to the memory in response thereto. A processor is interconnected with the memory, and the recorder unit is disconnectable from the vehicle interface unit and connectable to an external device, such as a computer or printer, for outputting to the external device a third set of data signals from the memory which includes the first and second sets of data

- 3 -

signals. The vehicle interface unit is in the form of a module interconnected via a series of buses with the electrical system of the vehicle, with each bus providing a signal to the module indicative of the status of one of the vehicle's operating characteristics. The vehicle interface unit includes a processor interconnected with the buses for processing signals provided thereby and for generating the first set of data signals in response thereto. The vehicle interface unit may be interconnected with the ignition system of the vehicle, so as to prevent vehicle ignition unless the portable recorder unit is connected to the vehicle interface unit. The vehicle interface unit receives signals from the vehicle indicative of distance traveled by the vehicle, such as the signals provided to the vehicle's odometer. The manually operable data entry device is preferably in the form of a keypad, which allows an operator to input a signal to the memory indicative of the business or personal nature of the vehicle mileage. In addition to vehicle mileage, the vehicle interface unit may be interconnected with the electrical system of the vehicle to monitor other vehicle operating characteristics, such as brake operation, directional signal operation, seat belt use and headlight operation.

The invention further contemplates a method of monitoring vehicle operating characteristics and recording data. The method involves sensing one or more vehicle operating characteristics, and generating a first set of data signals indicative of the one or more sensed vehicle operating characteristics. The first set of data signals are stored in a portable recorder unit removably interconnected with the vehicle. The method further involves generating a second set of data signals by manual operation of a data entry device; storing the second set of data signals in the portable recorder unit; disconnecting the portable recorder unit from the vehicle and interconnecting the portable recorder unit with an

- 4 -

external device such as a printer or computer; and outputting to the external device a third set of data signals which includes the first and second sets of data signals. The particulars of the method are substantially
5 in accordance with the foregoing summary.

Various other features, objects and advantages of the invention will be made apparent from the following description taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

10 The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

Fig. 1 is a schematic representation of the vehicle monitoring and data recording system of the
15 invention, showing the vehicle interface unit interconnected with the vehicle's electrical system and the portable recorder unit interconnected with the vehicle interface unit;

Fig. 2 is a schematic representation showing
20 interconnection of the portable recorder unit with an external device such as a computer or printer;

Fig. 3 is a schematic representation of the components of the vehicle interface unit of the system of Fig. 1; and

25 Fig. 4 is a schematic representation of the components of the portable recorder unit of the system of Fig. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, a vehicle monitoring and
30 data recording system constructed according to the invention generally includes a portable data recorder unit (DRU) 20 and a stationary vehicle interface unit (VIU) 22 connected via a connector 24 with the electrical system of a vehicle. Typically, the vehicle's electrical system
35 includes an interface connector, shown generally at 26, located within the interior compartment of the vehicle. Interface connector 26 includes a series of terminals to

- 5 -

which vehicle interface unit 22 is connected via a series of buses interconnected with connector 24. Such terminals include a power terminal 28 which supplies power to VIU 22 from the vehicle via a bus 30; a ground terminal 32 providing ground potential to VIU 22 through connector 24 and a bus 34; a start terminal 36 and a start enable terminal 38 providing signals to VIU 22 through connector 24 and buses 40, 42, respectively; an ignition terminal 44 providing an ignition signal to VIU 22 through connector 24 and a bus 46, and operating state terminals 48, 50, 52 and 54 providing input signals to VIU 22 through connector 24 and buses 56, 58, 60 and 62, respectively. State inputs A-D at terminals 48-54 may be that such as the vehicle's headlights, directional signals, brakes, seat belt indicators or the like.

Vehicle interface connector 26 further includes an odometer sensor 64 which provides pulses to a terminal 66 which are communicated via a bus 68 and connector 24 to VIU 22. Each pulse generated by sensor 64 is indicative of a predetermined distance traveled by the vehicle, which enables the vehicle odometer to output a mileage reading and the vehicle speedometer to output an instantaneous indication of the speed at which the vehicle is traveling.

DRU 20 includes a housing 70 having a front panel 72. A standard QWERTY keypad, shown generally at 74 is mounted to front panel 72, along with a numeric keypad 76, a power key 78, an "enter" key 80, and a personal/business/commute (P/B/C) key 82. A series of cursor movement keys 84, 86, 88 and 90 are also mounted to housing front panel 72. A display 92, such as an LCD display, is mounted to housing front panel 72 above keypad 74.

DRU 20 and VIU 22 are interconnected with each other via a conventional six-wire RJ11/14 shielded power and communications cable 94. RJ11/14 connectors or ports 96, 98 are provided on VIU 22 and DRU 20, respectively,

- 6 -

for receiving the ends of cable 94. Cable 94 can be disconnected from either or both of connectors 96, 98, enabling DRU 20 to be removably connected to VIU 22.

As shown in Fig. 2, DRU 20 can be interconnected with external devices, such as a computer 100 or a printer 102, equipped with communication ports 104, 106, respectively. Computer 100 and printer 102 are adapted for interconnection with DRU 20 by communication links 108, 110, respectively. Preferably, DRU 20 is connectable to either one or the other of computer 100 or printer 102, so as to enable information contained within DRU 20 to either be downloaded into a data storage device associated with computer 100 or to be printed through printer 102.

The components of VIU 22 are illustrated in Fig. 3. As noted previously, VIU 22 is interposed between vehicle interface connector 26 and DRU 20, with DRU 20 being removably connectable to VIU 22 through communication ports 96.

VIU 22 concludes a programmable microcontroller 112. Microcontroller 112 receives power from the vehicle through voltage and current protection circuit 114 interconnected with the vehicle's power source, such as a battery, via line 30, and ground potential through line 32; a voltage regulator 116 interconnected with voltage and current protection circuit 114 via a line 118; and a power conditioning circuit 120 interconnected with voltage regulator 116 via a line 122, and with microcontroller 112 via a line 124. Microcontroller 112 receives input voltage signals through a signal voltage conditioning circuit 126, which is interconnected with start terminal line 40, start enable terminal line 42, ignition line 46, and vehicle operating state input lines 56, 58, 60 and 62. These input voltage signals are provided to microcontroller 112 through lines 128, 130, 132, 134, 136, 138 and 140, respectively.

- 7 -

A manually operable bypass switch 142 is interconnected between start line 40 and start enable line 42. A start enable relay 144 receives power from a line 146 interconnected with line 118, and is interconnected with
5 start enable line 42 and with start line 40 through a line 148. Start enable relay 144 is interconnected with microcontroller 112 through a line 150.

Vehicle mileage pulse line 68 is interconnected with microcontroller 112 through a low level signal
10 conditioning circuit 152 having an enabling circuit 153, and a line 154. An RS-232 communications transceiver 156 including an enabling circuit 158 transmits signals to microcontroller 112 through a line 160, and receives signals from microcontroller 112 through a line 162.
15 Enabling circuit 158 of transceiver 156 is interconnected with microcontroller 112 via a line 164, which in turn is interconnected with enabling circuit 153 of low level signal conditioning circuit 152 via a line 166. A conventional resonator 168 is interconnected with microcon-
20 troller 112 through lines 170, 172.

Through communication port 96, protected voltage and ground potential is provided to DRU 20 through lines 174, 176, respectively. Cable 94 includes a line
25 178 which transmits signals from microcontroller through transceiver 156 to DRU 20, and a line 180 which transmits signals from DRU 20 to microcontroller 112 through transceiver 156.

Fig. 4 illustrates the components of DRU 20. DRU 20 includes a programmable microcontroller 184 inter-
30 connected with a conventional resonator 186 via a line 188. DRU 20 further includes an RS-232 transceiver 190, which is interconnected with lines 178, 180 from VIU 22 through DRU communication port 98. Transceiver 190 transmits signals to microcontroller 184 through a line
35 192, and receives signals from microcontroller 184 through a line 194. Transceiver 190 further includes an

- 8 -

enabling circuit 196, which is interconnected with microcontroller 184 through a line 198.

DRU 20 is further equipped with a rechargeable battery 200, which is charged by a charge circuit 202 and
5 lines 204, 206 and 208. Charge circuit 202 is interconnected with power line 210, which in turn is interconnected with lines 174, 176 from VIU 22 for transmitting power to DRU 20. Line 208 further provides power to an LCD intensity control 212. Power is supplied from battery 200 or charge circuit 202 to a voltage drop circuit
10 214 and to microcontroller 184 through a line 216. Similarly, power is supplied from charge circuit 202 to a voltage regulator circuit 218 including an enabling circuit 220. A line 222 extends between voltage regulator 218 and a program memory 224, and a line 226 extends
15 between voltage regulator circuit 218 and microcontroller 184. A line 228 interconnects voltage regulator enabling circuit 220 with microcontroller 184.

A line 230 extends between power line 222 and
20 transceiver 190.

Microcontroller 184 is further interconnected with a contrast control circuit 232 through a line 234, and contrast control circuit 232 in turn is interconnected with transceiver 190 through a line 236 and with an
25 LCD controller/driver circuit 238 through a line 240. Power is supplied to LCD controller/driver circuit 238 through a line 242 from power line 222. Microcontroller 184 is interconnected with intensity control circuit 212 through a line 244.

30 Power is supplied to microcontroller 184 from battery 200 through line 216, or from charge circuit 202 through voltage regulator 218 and a line 246 extending between microcontroller 184 and power line 222.

Program memory 224 is interconnected with
35 microcontroller 184 through a line 248, and a nonvolatile RAM 250 is interconnected with microcontroller 184 through lines 252, 254. A clock 256 having a crystal 258

- 9 -

is interconnected with RAM 250 through a line 260, and with microcontroller 184 through a line 262.

An audible beeper 264 is interconnected with microcontroller 184 through a line 266. Microcontroller
5 184 is interconnected with LCD controller/driver circuit 238 through a line 268, and LCD 92 is interconnected with LCD controller/driver circuit 238 through a line 270. LCD back light intensity control circuit 212 is interconnected with an LCD back light 272 through a line 274.

10 In operation, the above-described components function as follows. Initially, VIU 22 is interconnected with vehicle interface connector 26, and is mounted in an inconspicuous location within the interior of the vehicle. To operate, DRU 20 is connected to VIU 22 using
15 communication and power cable 94, and DRU power key 78 is depressed to provide power to DRU 20 through VIU 22, or from battery 200. Upon power-up of DRU 20, a unique identifying signal is communicated from DRU 20 to VIU 22, and VIU microcontroller 112 is programmed so as to allow
20 vehicle operation only by a person (or persons) possessing a DRU 20 having an acceptable identifying code. When the code of DRU 20 and the preprogrammed acceptable code(s) of VIU 22 match, VIU microcontroller 112 sends a signal through line 150 to start enable relay circuit
25 144, which functions to interconnect start terminal 36 and start enable terminal 38 of vehicle interface connector 26, thus allowing ignition of the vehicle.

As an alternative, bypass switch 142 can be operated to interconnect start terminal 36 with start
30 enable terminal 38.

Upon ignition of the vehicle, DRU microcontroller 184 sends a signal through line 266 to actuate beeper 264, to provide an audible prompt to the operator. The operator then depresses P/B/C key 82 to select whether
35 the mileage to be driven is personal, business or for commuting, and such information is communicated to DRU microcontroller 184 and a corresponding legend appears on

- 10 -

display 92. As the vehicle is operated, the distance pulses from vehicle interface connector terminal 66 are communicated to VIU microcontroller 112 through pulse signal conditioning circuit 152 and line 154. This information is then communicated to DRU microcontroller 184 through VIU transceiver 156 and DRU transceiver 196, and DRU microcontroller 184 then converts such signals into mileage information, which is communicated to and stored in RAM 250. Simultaneously, date and time information is communicated to RAM 250 from clock 256.

Each time the operator changes the designation of the mileage traveled by depressing P/B/C key 82, such information is communicated to DRU microcontroller 184 and to RAM 250, along with date and time information from clock 256. This enables the operator to accurately keep track of business, personal and commuting miles, along with the dates and times such mileage was covered.

At the same time mileage information is communicated through DRU microcontroller 184 to RAM 250, other information pertaining to vehicle operating characteristics is communicated from state input terminals 48, 50, 52 and 54 of vehicle interface connector 26 to RAM 250 through DRU microcontroller 184 and VIU microcontroller 112. For instance, such information may pertain to characteristics such as operation of the vehicle headlights, directional signals, brake lights or seat belt indicator. This information is stored in RAM 250 for a predetermined amount of time, e.g. five or ten minutes. If desired, this vehicle operating characteristic information can be extracted from RAM 250, so as to enable a person to determine these vehicle operating characteristics for the preceding five or ten minute time period, which may be useful in accident investigations or the like.

When the operator is finished operating the vehicle, DRU 20 is disconnected from VIU 22, and the operator can then carry DRU 20 along in a briefcase,

- 11 -

purse or the like. Information pertaining to other expenses incurred by the operator can be input into DRU 20 using QWERTY keypad 74 and numeric keypad 76. Such information is displayed on display 92, and simultaneously stored in RAM 250 through DRU microcontroller 184.

Whenever desired, the operator interconnects DRU 20 with either computer 100 or printer 102. By depressing appropriate buttons of keypad 74, the information stored in DRU RAM 250 is either downloaded into computer 100 or communicated to printer 102 for printing a hard copy of an expense report. When communicating information to computer 100, such information can be interfaced with an expense management program or the like so as to enable such information to be incorporated thereinto.

Appropriate software is loaded into program memory 224 through DRU microcontroller 184 to carry out the above steps. The software stored in program memory 224 can be modified or replaced as desired, permitting DRU 20 to be field programmable for accommodating software updates and/or custom programs for specific user requirements.

Referring back to Fig. 1, other devices, shown generally as future interface modules 280, can be interconnected with DRU 20 through a communication link 282 and a connector 284. For example, such devices may include a portable communication device such as a radio transmitter or a cellular telephone. A communication device such as this enables an operator to relay information contained within DRU RAM 250 to a remote receiving device, such as a radio receiver or other cellular communication device, for communicating information from RAM 250 to a remote station. Representative applications for this type of system include transmitting expense information from traveling sales personnel to a central expense tracking facility, or transmitting transportation service information to a central facility. For example, a trans-

- 12 -

portation service for disabled individuals can input a unique identifying code for each user, and information pertaining to the distance the user was transported can automatically be transmitted to a central processing
5 facility for enabling the transportation service to rapidly generate a bill for such transportation services rendered to that individual. Numerous other applications for the system of the invention are contemplated, utilizing either transmitting or receiving equipment.

10 Various alternatives and embodiments are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter regarded as the invention.

- 13 -

CLAIMS

We claim:

1. A vehicle monitoring and data recording system for use with a vehicle, comprising:

a vehicle interface unit adapted for interconnection with the electrical system of the vehicle for
5 sensing one or more vehicle operating characteristics and for outputting a first set of data signals indicative of the sensed vehicle operating characteristics; and

a portable recorder unit adapted for removable interconnection with the vehicle interface unit, comprising a memory; an input for receiving the first set of
10 data signals from the vehicle interface unit and for providing the first set of data signals to the memory; a manually operable data entry device for allowing an operator to input data and for outputting a second set of
15 data signals in response thereto to the memory; and a processor interconnected with the memory; wherein the data recorder unit is disconnectable from the vehicle interface unit and connectable to an external device for selectively outputting, to the external device, a third
20 set of data signals from the memory which includes at least the first and second sets of data signals.

2. The system of claim 1, wherein the vehicle interface unit comprises a module interconnected via a series of lines with the vehicle electrical system, each line providing a signal to the vehicle interface unit
5 module indicative of one of the vehicle's operating characteristics.

3. The system of claim 2, wherein the vehicle interface unit includes a processor interconnected with the lines for processing signals received from the lines and generating the first set of data signals in response thereto.

4. The system of claim 3, wherein the vehicle interface unit is interconnected with the ignition system of the vehicle and includes an arrangement for preventing

- 14 -

5 vehicle ignition unless the data recorder unit is connected to the vehicle interface unit.

5. The system of claim 4, wherein the vehicle ignition system includes a start terminal and a start enable terminal, and wherein the ignition preventing arrangement comprises a circuit including the processor
5 for detecting connection of the data recorder unit to the vehicle interface unit.

6. The system of claim 5, wherein the vehicle interface unit includes a programmable device for entering a unique identifying code for each individual authorized to operate the vehicle, and wherein the vehicle
5 interface unit processor functions to prevent vehicle ignition by an unauthorized individual.

7. The system of claim 1, wherein the vehicle interface unit is interconnected with the input to the vehicle's odometer to receive data signals therefrom and to enable monitoring of the vehicle's mileage.

8. The system of claim 7, wherein the manually operable data entry device comprises a keypad including a key allowing an operator to input a signal to the memory of the data recorder unit indicative of business or
5 personal operation of the vehicle.

9. The system of claim 7, wherein the vehicle interface unit is further interconnected with the electrical system of the vehicle to sense one or more of the following vehicle operating characteristics; brake operation,
5 tion, directional signal operation, and headlight operation, and seat belt operation.

10. The system of claim 1, wherein the vehicle interface unit is interconnected with an electrical interface connector associated with the vehicle for receiving signals therefrom indicative of one or more of
5 the vehicle operating characteristics.

11. A method of monitoring vehicle operating conditions and recording data, comprising the steps of:

- 15 -

sensing one or more vehicle operating characteristics;

5 generating a first set of data signals indicative of the one or more sensed vehicle operating characteristics;

 storing the first set of data signals in a portable recorder unit removably interconnected with the
10 vehicle;

 generating a second set of data signals by manual operation of a data entry device;

 storing the second set of data signals in the portable recorder unit;

15 disconnecting the portable recorder unit from the vehicle and interconnecting the portable recorder unit with an external device; and

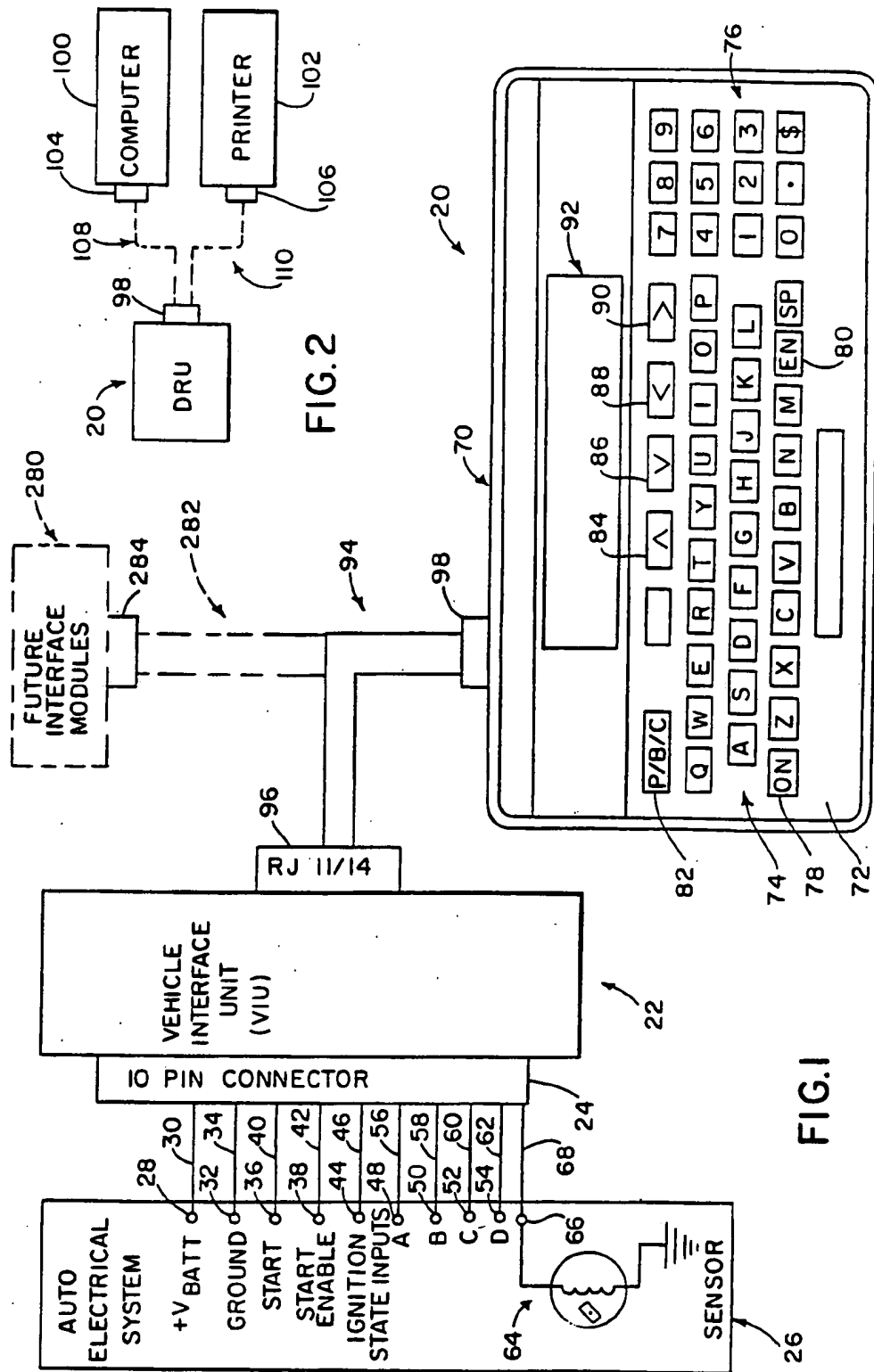
 selectively outputting, to the external device, a third set of data signals from the portable recorder
20 unit which includes at least the first and second sets of data signals.

12. The method of claim 11, wherein the step of sensing one or more vehicle operating characteristics is carried out by permanently mounting a vehicle interface unit to the electrical system of the vehicle for
5 receiving signals therefrom indicative of one or more vehicle operating characteristics, wherein the portable recorder unit is removably interconnectable with the vehicle interface unit.

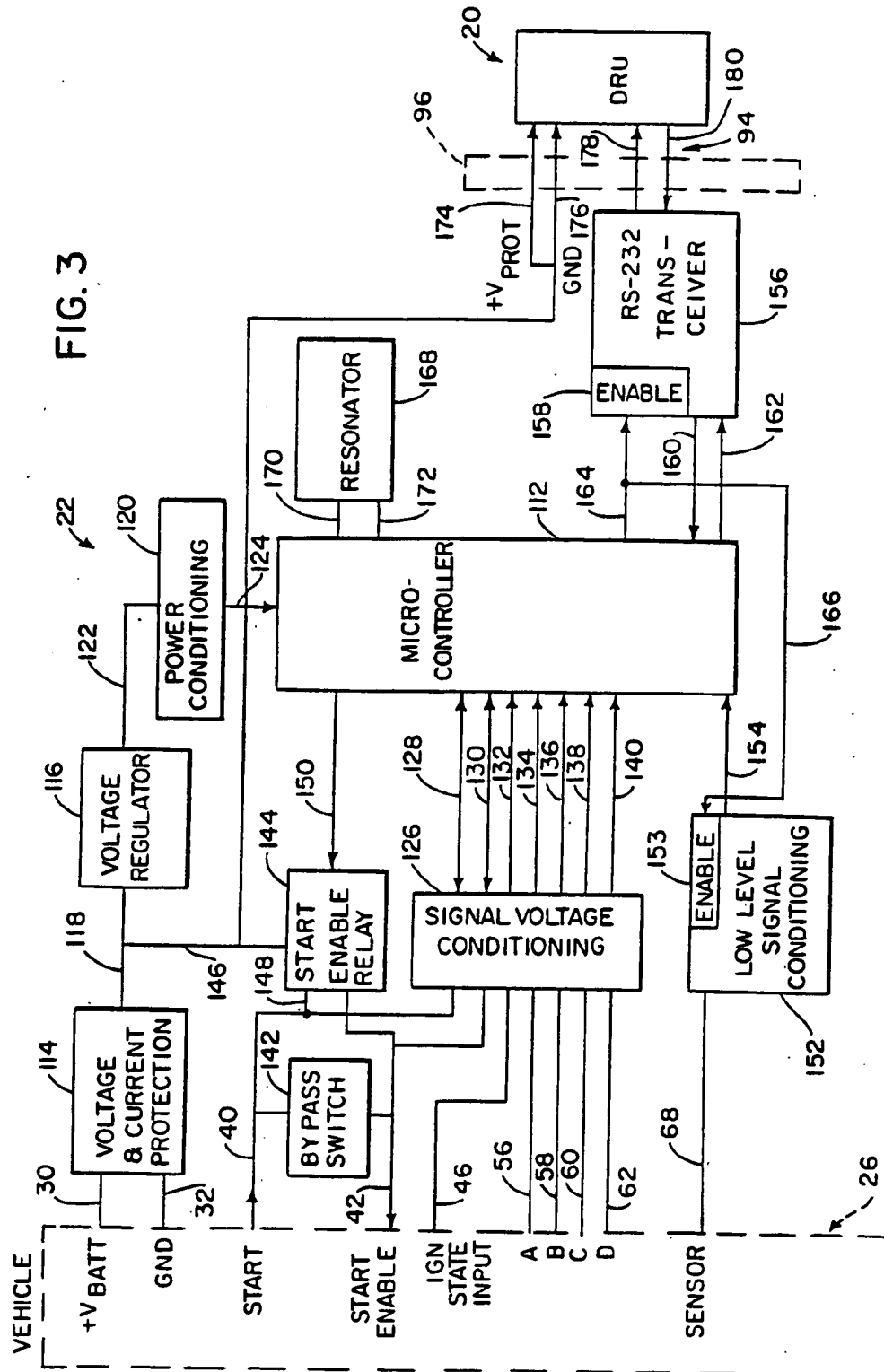
13. The method of claim 12, wherein the step of generating a second set of data signals by manual operation of a data entry device is carried out by manual operation of a keypad provided on the portable recorder
5 unit.

14. The method of claim 13, wherein the step of generating a second set of data signals comprises generating a set of data signals indicative of personal or business use of the vehicle by manual operation of the
5 keypad.

1/3



2/3



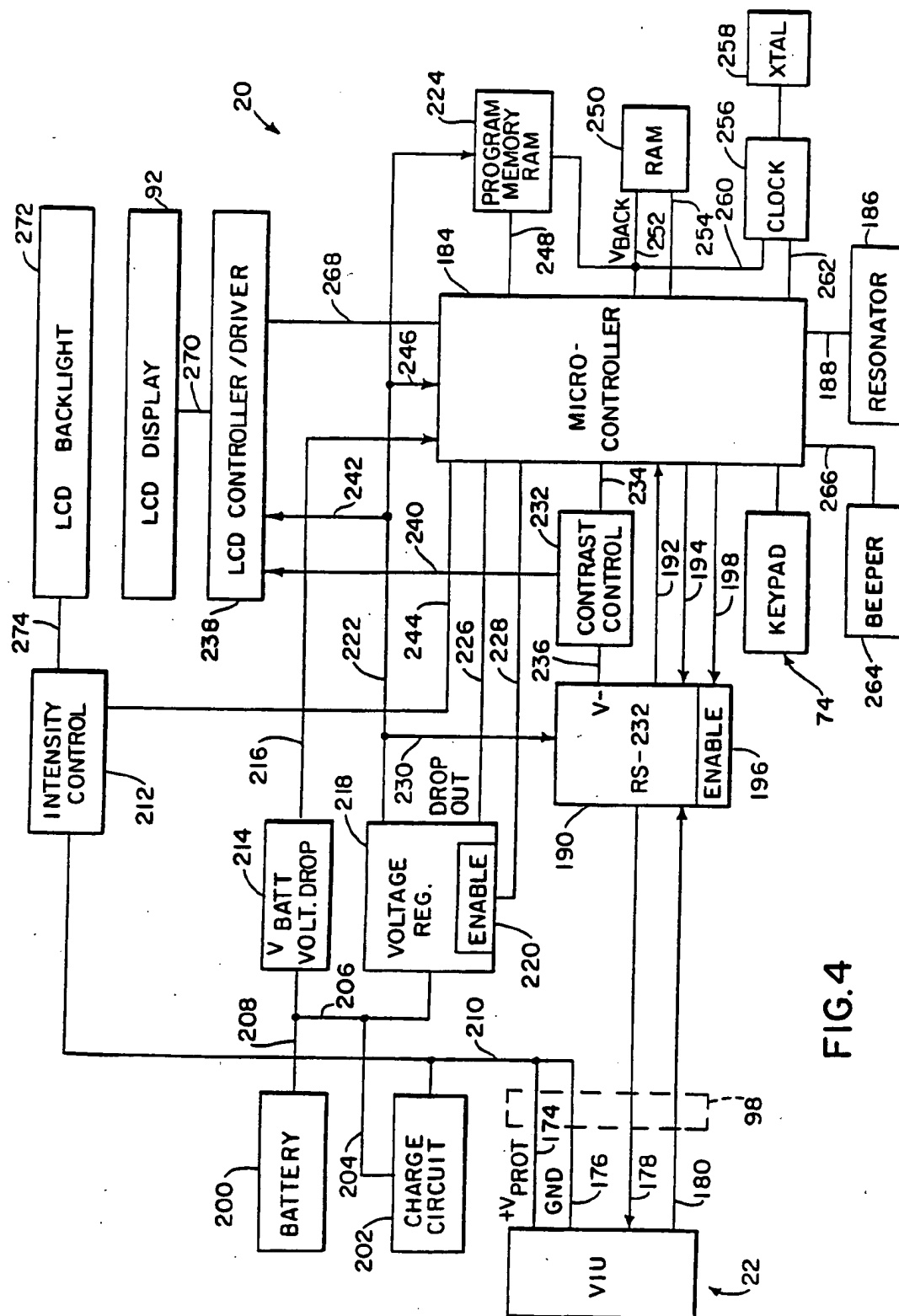


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 94/06122

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G07C5/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 G07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,31 47 314 (WESSER) 9 June 1983 see page 5, line 19 - page 9, line 26 see page 10, line 15 - page 19, line 8; figures	1,2,7,8
Y		9-14
A		4-6
Y	EP,A,0 224 616 (GELHORN) 10 June 1987 see column 3, line 29 - column 7, line 4; claims; figures	1-14
Y	DE,A,32 21 399 (KIENZLE) 8 December 1983 see page 4, line 17 - page 7, line 26 see page 8, line 30 - page 9, line 30; claim 1; figures	1-3,7,8
A		9-12
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

30 September 1994

Date of mailing of the international search report

17.10.94

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Meyl, D

INTERNATIONAL SEARCH REPORT

Inter. Appl. Application No
PCT/US 94/06122

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB,A,2 244 582 (BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY) 4 December 1991 see abstract; claims; figures see page 2, line 29 - page 3, line 18	4-6
A	---	1,2,11
A	GB,A,2 119 095 (GOLDCREST ELECTRONICS) 9 November 1983 see page 2, line 17 - page 3, line 26 see page 3, line 56 - page 4, line 22 see page 6, line 5 - line 51; figures	1-3,5, 7-12
A	---	
A	WO,A,92 22043 (WB ELECTRONIC) 10 December 1992 see page 14, line 20 - page 15, line 29 see page 19, line 13 - page 20, line 5; figures	1-3,7-14
A	---	
A	WO,A,82 02785 (DYRDAK) 19 August 1982 see page 3, line 10 - line 34 see page 5, line 5 - page 6, line 8 see page 9, line 22 - page 11, line 21; figures	1,7-11
A	---	
A	US,A,4 939 652 (STEINER) 3 July 1990	
A	---	
A	EP,A,0 495 104 (K.K. KOMATSU SEISAKUSHO) 22 July 1992	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. Appl. Application No

PCT/US 94/06122

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-3147314	09-06-83	NONE	
EP-A-0224616	10-06-87	US-A- 4547781	15-10-85
DE-A-3221399	08-12-83	NONE	
GB-A-2244582	04-12-91	NONE	
GB-A-2119095	09-11-83	NONE	
WO-A-9222043	10-12-92	DE-A- 4118486	10-12-92
		DE-A- 4200863	22-07-93
		DE-U- 9200512	19-03-92
		DE-U- 9201776	09-04-92
		EP-A- 0591249	13-04-94
WO-A-8202785	19-08-82	EP-A- 0083578	20-07-83
US-A-4939652	03-07-90	CA-A- 1282175	26-03-91
EP-A-0495104	22-07-92	JP-A- 3243438	30-10-91
		JP-A- 3118693	21-05-91
		JP-A- 3197261	28-08-91
		AU-B- 645761	27-01-94
		AU-A- 6415990	28-04-91
		WO-A- 9105319	18-04-91
		US-A- 5250761	05-10-93